

Appl'n. No. 09/752,557
Response dated February 20, 2006
Reply to Office Action of Dec. 1, 2005

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Claim 1 (currently amended): A device for performing surgery or therapeutic interventions on a patient, comprising:

a first curvature sensor configured to be placed externally on a patient,
the first curvature sensor providing an output readable by a computer;
imageable fiducials coupled to the first curvature sensor; and
an attachment fixture coupled to the first curvature sensor; and
~~a computer receiving the output of the curvature sensor~~
wherein the computer is configured to relate the curvature of the first
curvature sensor to the location of the imageable fiducials.

Claim 2 (Cancelled)

Claim 3 (currently amended): The device of claim 1, further comprising:

a second curvature sensor providing an output readable by the computer,
the second curvature sensor having a first end and a second end and capable
of being coupled to the attachment fixture at the first end; and
a tool connector coupled to the second end of the second curvature
sensor.

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Claim 4 (original): The device of claim 3, further comprising a second attachment fixture capable of being positioned at a known location with respect to the first curvature sensor, wherein the second end of the second curvature sensor is coupled to the second attachment fixture and the tool connector is coupled to the second curvature sensor between the first end and the second end.

Claim 5 (original): The device of claim 3, further comprising a monitor for positionally displaying the tool connector with respect to the patient.

Claim 6 (cancelled)

Claim 7 (original): The device of claim 3, further comprising an optical tracking system electronically coupled to the computer and configured to positionally track the tool connector or a tool positioned in the tool connector.

Claim 8 (original): The device of claim 7, wherein the computer uses both the second curvature sensor and the optical tracking system to positionally track the tool connector or a tool positioned in the tool connector.

Claim 9 (original): The device of claim 1, wherein the computer is configured to determine an attachment fixture-centered frame of reference based on the output of the curvature sensor.

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Claim 10 (original): The device of claim 1, wherein the first curvature sensor comprises a fiber optic curvature sensor.

Claim 11 (currently amended): The device of claim 1, wherein the attachment fixture comprises:

at least one imageable fiducial; and
a latching mechanism configured for attaching to the first end of the second curvature sensor.

Claim 12 (currently amended): A device for performing surgery or therapeutic intervention on a patient, comprising:

an attachment fixture;
at least one imageable fiducial coupled to the attachment fixture, the imageable fiducial being capable of being detected by a medical imaging system;
a curvature sensor having a first end and a second end and capable of being coupled to the attachment fixture at the first end, the curvature sensor configured to be placed externally on a patient, the curvature sensor configured to provide an output readable by a computer; and

~~a tool connector coupled to the second end of the curvature sensor; and a computer electronically coupled to the curvature sensor;~~
wherein the computer is configured to relate the curvature of the first

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curvature sensor to the location of the imageable fiducials.

Claim 13 (currently amended): A device for use in an image guided therapy or image guided surgery system, comprising:

a curvature sensor configured to be applied externally to a portion of a patient, the curvature sensor being adapted to measure and provide [[an]] a computer readable output of the curvature the portion of the patient to a computer; and

imageable fiducials located on the first curvature sensor;

an attachment fixture coupled to the curvature sensor, the attachment fixture comprising an imageable fiducial; and

wherein the computer is configured to relate the curvature of the first curvature sensor to the location of the imageable fiducials.

Claim 14 (cancelled)

Claim 15 (original): The device for use in an image guided therapy or image guided surgery system according to claim 13, wherein the curvature sensor comprises a fiber optic curvature sensor.

Claim 16 (original): A device for generating a patient based frame of reference for an image guided therapy or image guided surgery system, comprising:

a curvature sensor configured to be applied externally to a portion of a

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patient, the curvature sensor being adapted to measure and provide an output readable by a computer of the curvature the portion of the patient; imageable fiducials coupled to the first curvature sensor; and an attachment fixture coupled to the curvature sensor at a known position with respect to the curvature sensor; and wherein the computer is configured to relate the curvature of the first curvature sensor to the location of the imageable fiducials.

Claim 17 (currently amended): A device for generating a patient-based frame of reference for an image guided therapy or image guided surgery system according to claim 16, wherein each of the imageable fiducials are further comprising a plurality of fiducials, each fiducial of the plurality of fiducials being coupled to the curvature sensor at known inter-fiducial distances.

Claim 18 (currently amended): A device for generating a frame of reference for an image guided therapy or image guided surgery system, comprising:
a ribbon configured to be placed externally on a patient, the ribbon being comprised of one or a combination of plastic, metal wire, metal strip, fabric, rubber, synthetic rubber, nylon, thread, glass, or paper;
a plurality of imageable fiducials attached at known inter-fiducial distances along the ribbon; and
an attachment fixture coupled to the ribbon at a known position with respect to the plurality of imageable fiducials;

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wherein a computer is configured to use imaging of the imageable fiducials to relate the curvature of the ribbon to the location of imageable fiducials.

Claim 19 – 25 (cancelled)

Claim 26 (currently amended): A system for monitoring or enabling surgery on a patient at a distance, comprising:

a first curvature sensor configured to be placed externally on the patient,
the first curvature sensor providing an output readable by a computer;
imageable fiducials coupled to the first curvature sensor;
an attachment fixture attached to the first curvature sensor;
a second curvature sensor having a first end and a second end and capable of being coupled at the first end to the attachment fixture, the second curvature sensor providing an output readable by a computer; and
a tool capable of being coupled to the second end of the second curvature sensor; and

~~a computer receiving the outputs of the first curvature sensor and the second curvature sensor and adapted to provide an output of the curvature of the first curvature sensor and the position and orientation of the tool coupled to the second end of the second curvature sensor with respect to the attachment fixture; and~~

~~a communication device electronically coupled to the computer and~~

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~~adapted to communicate the output of the computer to a distant receiver.~~

wherein the computer is configured to:

relate the curvature of the first curvature sensor to the location

of the imageable fiducials;

provide an output of the curvature of the first curvature sensor

and the position and orientation of the tool coupled to the second

end of the second curvature sensor with respect to the attachment

fixture; and

communicate the output of the computer to a distant receiver

using a communication device that is electronically coupled to the

computer.

Claim 27 (currently amended): A device for monitoring the motions of a body,

comprising:

a garment configured to be applied externally to a body, the garment

comprising,

at least one curvature sensor configured to provide an output

readable by a computer;

imageable fiducials coupled to at least one of the curvature sensors;

and

a plurality of filaments coupled to the plurality of curvature sensors to form a mesh; and

a communication device configured to communicate the output of the

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curvature sensors to a distant receiver; and
wherein the computer is configured to relate the curvature of curvature
sensors to the location of imageable fiducials.

Claim 28 – 30 (cancelled)

Claim 31 (currently amended): A device for conducting surgery or therapy on a body, comprising:
means for externally measuring the curvature of a body;
means for locating the position of the means for externally measuring the curvature of a body within a frame of reference;
means for determining the position of a tool with respect to the means for externally measuring the curvature of a body; and
means for registering a volumetric image of the body to the means for externally measuring the curvature of a body.